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Phytogeography of South Africa.—The very diverse vegetational types of South Africa have been classified and mapped by Evans[6] in such a manner as to give a good idea of the ecological divisions of the southern part of that continent. The woodland has been subdivided into forest, scrub, bushveld, and palmveld. The first of these, which is mostly evergreen, is dominated by species of *Podocarpus*, while the scrub is a type of Sclerophyllous Shrub, in which the Proteaceae, Ericaceae, and Restionaceae contribute the dominant forms. From this the bushveld differs in its deciduous character and also in its more parklike aspect and its floristic composition. Bushveld is widely distributed, and while dominated by *Acacia* spp., such genera as *Tamarix*, *Combretum*, *Ficus*, *Zizyphus*, and *Rhus* are of common occurrence. The palm belt comprises a littoral strip on the southeast in which such palms as *Mimusops caffra*, *Phoenix reclinata*, *Raphia vinifera*, and *Cocos nucifera* mingle with succulents from the genera *Aloe* and *Euphorbia.*

The grassland covers the greater portion of the country with transitions to scrub and desert. That of the Kalahari region occupies much of the central portion of South Africa with an open formation, short, low, wiry grasses, species of *Aristida* and *Eragrostis*, occurring in isolated tufts. This and the other grasslands show transitions to the desert toward the west.

Four distinct desert types are briefly characterized and mapped, perhaps the most remarkable being the southern portion, a vast shallow basin, the Karroo, sparsely populated by succulent, tuberous, and bulbous plants. Prominent genera are *Crassula*, *Mesembryanthemum*, *Cotyledon*, *Euphorbia*, *Aloe*, *Stapelia*, *Senecio*, *Encephalartos*, and *Euclea.*

More important perhaps than the text, at least for the American botanist, are the excellent plates, enabling one to visualize the different types, and the map showing their distribution.—Geo. D. Fuller.

Pigment production in Penicillium.—Brenner,[7] investigating the production of pigment in cultures of *Penicillium*, finds that in the absence of magnesium in the culture medium, or in the presence of ammonium salts whose utilization leads to an acid reaction of the culture fluid, no red, but only yellow pigment is produced. The red pigment is produced only in neutral media or in media developing an alkaline reaction. Iron apparently is not necessary for the formation of the red color. The author further reports a few preliminary experiments on the extraction and chemical reactions of the pigment which is insoluble in ether, chloroform, toluene, and similar organic solvents, but soluble in alcohol and dilute alkalies or ammonia. On account of the acid nature of the pigment the author attributes to it the physiological function of maintaining the neutrality of the medium.

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[6] Evans, F. B. Pole, The plant geography of South Africa. Dept. Agric. Union of South Africa. Official Year Book. 1917. pp. 8. *pls. 24. map.* 1918.

[7] Brenner, W., Die Farbstoffbildung bei *Penicillium purpurogenum.* Svensk. Bot. Tidskr. **12**:91–102. 1918.

Many investigations have been made on the so-called influence of various environmental factors on the production of pigments by fungi, but a survey of the facts seems to indicate that between the absorption of an elementary nutrient and the production of a complex pigment two processes intervene to permit of the establishment of a direct relation between stages at the extreme ends of the series. A much better knowledge than is at hand at present of the nature and structure of fungous pigments is necessary before their physiological status can be determined. Different colors may often be due to the modification of the same pigment, depending on different reactions of the medium.—H. HASSELBRING.

Origin and goal of geobotany.—RÜBEL[8] has issued a compact and useful paper, dealing with the main phases of the development of geobotany and with the aims of its various subdivisions. Geobotany he regards as embracing all interrelations between plants and the earth, including much of ecology, chorology, chronology, and genetics; thus it includes all of phytogeography in the widest sense, and more. The historical presentation deals especially with the work of THEOPHRASTUS, TOURNEFORT, LINNAEUS, HALLER, SOULAVIE, WILLDENOW, HUMBOLDT, WAHLENBERG, and SCHOUW. Geobotany may be either floristic or vegetational, each of which subdivisions may consider the problems of space (distribution), habitat (ecology), or change (genetics). Thus RÜBEL recognizes 6 fields of geobotany: autochorology, or floristics; synchorology, or the distribution of plant associations; autecology, or the relation between the individual and the habitat; synecology, or the relation between the plant association and the habitat; autogenetics, or the change of floras; and syngenetics, or the change of plant associations. It appears to the reviewer that this is the most logical classification of these fields of study with which he is familiar. As a matter of practice, however, it is unlikely that investigators will increasingly recognize such subdivisions. A treatise dealing only with synchorology was fairly satisfactory in times gone by, but in these days it would seem sterile, except as livened up with ecology and genetics.—H. C. COWLES.

Continuous variation.—STOUT and BOAS,[9] as the result of their extensive statistical studies of variation in *Cichorium*, recommend that critical study of species variation should be based upon intensive studies of partial (existing among the parts of a single individual) and individual (characteristics of plants as wholes based on their entire record) variabilities. They suggest that failure to appreciate this necessity has allowed considerable error to creep into the work of a number of investigators. For example, hereditary studies of such

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[8] RÜBEL, EDUARD, Anfänge und Ziele der Geobotanik. Vierteljahrsschrift der naturforschenden Gesellschaft in Zürich **62**:629–650. 1917.

[9] STOUT, A. B., and BOAS, HELENE M., Statistical studies of flower number per head in *Cichorium Intybus:* kinds of variability, heredity, and effects of selection. Mem. Torr. Bot. Club **17**:334–458. *pls. 10–13.* 1918.